CT Science Content Standard 5.1a- Sound
Sound and light are forms of energy.

Teacher Trail Guides

Trail Guide for All Galleries: 5.1a Sound

As you move through the science center be thinking about the following questions and record your ideas in your science notebook as you move to the different exhibits:

How do sound and noise impact visitors in the gallery?

Do you think the designers purposefully design floor, wall, and ceiling treatments to affect the echoes and transmission of sound from one room to another? Describe one such example.

Be on the lookout for an area in the museum that seems very quiet. Notice what is on the floors, the walls, and the ceilings in this area. Do you notice an area in the museum where sounds (like clapping) are easily reflected?

Notice what is on the floors, the walls, and the ceilings in this area. Are stairwells designed to minimize or maximize noise? Why do you think so?

Teacher Notes:

Carpets and special acoustic ceiling tiles are used to minimize reflected sound and echoes so that visitors are not overwhelmed by too much sound or noise in one place. Auditoriums and galleries have walls that act as sound baffles and curtains to absorb sound rather than reflecting it. If sounds reflect off of multiple surfaces and arrive at your location out of synch, it can be chaotic and confusing. Usually there is carpeting in a library for this same purpose. Classrooms also use acoustic ceiling tiles so that sounds do not travel to adjacent spaces.

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Trail Guide Moon Projection Globe: 5.1a Sound

Visit the Exploring Space Gallery
Go to the Moon Projection Globe

Turn and talk with a partner about what you think for each of the following questions. Record your answers in your science notebook.

What would you hear if another astronaut beat a drum while both of you were standing on the moon?

Assume that you had a sensitive microphone outside of your space suit so that you would be able to hear sounds. What would you hear as you shuffled your feet on the surface?

If you think you will hear something, what pathway will the sound energy take to get to your ears?

Diagram what you think in your science notebook.

Teacher Notes:
Sound is vibrations passed through a medium as waves. Sound requires a medium (such as air) in order to be transmitted. If someone else is beating a drum, you will not be able to hear it. If you strike the drum yourself, some sound may be transmitted through the suit and your skeleton to your head such that your ear can pick something up. If you shuffle your feet, it will not produce a sound in the moon's atmosphere, but again it may be transmitted through your shoes and you may *feel* the vibrations.

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Trail Guide Different Vibrations Create Distinct Patterns: 5.1a Sound

Visit the Sight and Sound Experience Gallery
Go to Different Vibrations Create Distinct Patterns

What happens when sound waves cause the metal plate to vibrate?

1. Sprinkle sand.
2. Change the frequency and look for patterns. Draw the different patterns formed in your science notebooks.

It's exciting to observe the intricate sand patterns, but why do you think they form?

Is there a relationship between the sound patterns formed and the shape of the plates? Turn and talk to your partner and record your answer in your notebook.

Teacher Notes:

Sound energy makes different patterns at different frequencies. The shape of the plate and the frequency of the sound affect the sand patterns. Sand tends to jump away from the vibrating places and settle at the still spots.

If you anchor one end of a slinky and shake the other end back and forth so that a "standing wave" is formed, you will notice nodes (quiet areas where the slinky barely moves) and antinodes (areas of maximum disturbance where the slinky travels farthest upward and downward from the center line.) Consider this for the sand formations on the vibrating plates.

Patterns occur on the plates because vibrations move outward from the mounting post and bounce off the edges of the plate and interfere with each other. Lower frequency waves make simpler patterns because their sound waves are longer and there are fewer of them that 'fit' on the plate.

If you would like to research more about this on the Internet, conduct a search on "Chladni plates".

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Trail Guide Invention Dimension Gallery: 5.1a Sound

Visit the Invention Dimension Gallery

Think about different inventions as you explore the gallery. Record your answers to the following questions in your science notebooks.

How were they created?

Listen to the sounds in the gallery.
Do you hear low pitch sounds or high pitch sounds?
Why do you hear differences?

Imagine:
You recently invented a clock that ticks louder than any existing clock.
How did you design your clock?

What materials did you use to cause this loud ticking?

Teacher Notes:
Sounds vary in loudness ("volume" or amplitude). Volume is affected by the strength of the force causing the vibration. For example, striking a drum forcefully or gently produces sounds with different volumes.

Connecticut Science Center

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Trail Guide Earth Observatory: 5.1a Sound

Visit the Planet Earth Gallery
Go to the Earth Observatory

You have a choice of many events on the main screen. Choose Lightning Around the World. Observe the lightning on the globe.

Imagine:

Your younger brother/sister/cousin asked why you see the flash of lightning before you hear the crash of thunder.

How will you answer this?

Record your explanation in your science notebook.

Teacher Notes:

Light travels significantly faster than sound. Light travels at 300 km per second, while sound travels at nearly 1/1000th of the speed, approximately 340 m/s. Many children are taught to count ("one Mississippi" or "one alligator") after seeing the flash of lightning to estimate how many thousand feet away the lightning bolt struck when they finally hear the accompanying thunder. Five seconds represents a distance of approximately one mile.